On the ORIGINAL *and* ACQUIRED MEANING *of the term* "STATISTICS," *and on the* PROPER FUNCTIONS *of a* STATISTICAL SOCIETY: *also on the* QUESTION *whether there be a* SCIENCE *of* STATISTICS; *and, if so, what are its* NATURE *and* OBJECTS, *and what is its* RELATION *to* POLITICAL ECONOMY *and* "SOCIAL SCIENCE." *By* WILLIAM A. GUY, M.B., F.R.C.P., *one of the Honorary Secretaries of the Statistical Society.*

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IT cannot, I think, be denied that those who cultivate the branch of knowledge which this Society was established to foster and promote, are held in less estimation than men who devote the same labour and similar talents to many other pursuits. This arises in part from misapprehensions as to the meaning of the word "Statistics," and as to the objects and aims of statistical inquiries; and in part to the common mistake of confounding the laborious collection of facts which constitutes the second process of every sound statistical inquiry with the whole procedure, overlooking alike the judgment and scientific insight which planned the inquiry, and the critical and analytical talent employed in discovering and displaying the truth. The aim of this communication is to vindicate the claim of Statistics to an honourable place among the sciences, and of statistical inquiries to the credit of which they have been unintentionally deprived. In carrying my purpose into effect, I shall observe the order of inquiry indicated in the title of the paper itself.

1. *On the Original and Acquired Meaning of the term "Statistics."*

The word "Statistik," from which the English "Statistics" is derived, is somewhat more than a century old. It appears to have been first used by Gottfried Achenwal, professor of law and politics at Göttingen, in his work entitled "Statsverfassung der heutigen "vornehmsten Europäischen Reiche und Völker,"* of which the first edition bears date 12th April, 1749. The word *Statistik* does not appear on the title page of the book, but is printed in large letters at the head of a short sketch of the bibliography of politics prior to the appearance of the author's work. This sketch is headed "Vor-"bereitung von der STATISTIK [Statskunde] überhaupt," and

* The sixth edition of this work has been purchased for the library of the Society.

gives a list of ten works in Latin and German published between the years 1668 and 1750, which works are best described as treatises on universal history; and it is followed by a philosophical disquisition in sixty-one sections, respecting the several elements which go to make up a full and complete history of a modern State. It is in this introduction that the original meaning of the term statistics is to be sought.

Now we find the author incidentally defining the term Statistik as that branch of learning (Disciplin) which occupies itself with the extent, limits, subdivisions, and natural relations of States, their advantages, their history, and their origin; as the description of the political constitution of one or more States; as synonymous with Statskunde and Statsbeschreibung (the science and the description of States). By statistics (die Statistik), he says, we attain to a knowledge of States and their constitution. But it is not everything that can be truly said of a State that properly finds a place in statistics, but only what contributes to political knowledge, and conduces, in an eminent degree, to the welfare of a State; so that the more any matter concerns the general well-being of a State the more necessary is it that it should find its illustration in statistics. Again, it is not what the vulgar care most about that proves most attractive to the statistical inquirer. The number of swine, or the first use of coffee in country parts, has more importance in his sight than the pedigrees of noble houses. And again, in speaking of statistical collections, the author insists that the facts of which they consist, should be as little as possible mixed up with reasonings. They ought to be mere facts. Lastly, this *Statistik* is worthy of honour, for from it history borrows a considerable portion of her light, to general public law it contributes most valuable material, and it enriches politics with a multitude of practical data.

What the author really means by statistics, is practically shown in the eight short treatises on Spain, Portugal, France, Great Britain, the Netherlands, Russia, Denmark, and Sweden, which constitute the body of his work. Taking Great Britain as our example, we find him first giving (in seven short sections under the head of Statsveränderungen) a short history of our origin and growth; then under the head of Länder, an account of our boundaries, climate, mountains, and streams, of our constituent parts, and their divisions into counties, with their productions; then under the head of Einwoner,* the number of inhabitants, and their character; next under Statsrecht, our fundamental laws, the order of regal succession, the prerogatives of the crown, the character of the government, the estates of the realm, the houses of parliament; next, under the

* It will be seen that I retain the spelling of this and other words as used by the author.

head of Hof- und Regierungs verfassung, the titles of the king and crown prince, the royal arms, the officers of state, the privy council, the State religion, our universities and places of education, our local government, our legal procedures, our manufactures, internal traffic, and external commerce, our coinage, our finances, system of taxation, and national debt, our army and navy. This account of Great Britain is finished by a short chapter headed Statsinteresse, in which the author sets forth in few words what he conceives to be the causes of the then prosperity of the nation which he, perhaps not inaptly, designates "the paradise of lawyers."

It will be seen, then, that Achenwal uses the word *Statistik* as strictly synonymous with *Statskunde*, or State-science, and *Statsbeschreibung*, or the description of States; and that under the name of statistics he describes the actual condition of a State under all its aspects—territorial, political, educational, religious, industrial, commercial, and financial—its means of offence and defence being given as a necessary part of its history, but the exploits of its army and navy being passed over or lightly touched upon. It will be seen also, that the use of figures is not insisted on, although facts, pure and simple, and as much as possible disencumbered of theories, are commended as of the greatest value.

From the general tone and spirit of Achenwal's introductory chapter, I infer that he felt the want of some one comprehensive word which should supersede the many terms in use at the time at which he wrote, such as Statskunde, Statsbeschreibung, Statslehre, Statswissenschaft, Statsrecht, Statskenntniss, Statsklugheit, &c. The meaning of some of these terms he defines very clearly, as in the following passage. "Statslere teaches how States should be: "Statskunde describes them as they are: Statsgeschichte shows "how they have become what they are. Statskunde is a stationary "Statsgeschichte, as this is a progressive Statskunde. It must "be understood, then, that we are not now treating of a States-"history according to the taste of the Anno Domini men, but "according to that of Robertson, Lagerbring, Gyannoni," &c.

The word Statistik, then, means the description of States as they are; and the description contemplated by the author is obviously such an one as the best modern historians carry into practical effect when they contend that history should not be a mere record of names, dates, wars, and political struggles, but also afford complete and faithful pictures of manners and customs, sciences and arts, industry and commerce—of everything, in fact, which contributes to the wealth, strength, honour and dignity of a nation.

Additional light is thrown on the meaning of the word *Statistik* by the incidental use of the word *Statisten* or *Statsgelerten*, the learned in matters of state, a word which is evidently the exact

equivalent of the word Statist, which our old English writers frequently employ—always in the sense of a man versed or busied in State matters, but with shades of difference. Shakspeare seems to use it in the sense both of politician and statesman. Ford, in the latter sense. Beaumont and Fletcher contrast *statists* with men of action. Milton speaks of *statists* and lawyers, and seems to use the word *statist* as synonymous with statesman, and with patriot. Wood describes Gardner as a great *statist*. Sir Thomas Browne classes *statists* and politicians together. Lastly, Carlyle quotes an old proverb, not intended to be very complimentary to us, "as the "*statist* thinks the bell clinks." The word "statism," again, is used by some old authors as synonymous with "policy," "the arts "of government," or statecraft; and the words "Statistical" and "Political," "Statist," "Statesman," and "Politician," are given as equivalent terms by Todd in his edition of Johnson. For most of these references, which are given *in extenso* below,* I am indebted to Todd's edition of Johnson's "English Dictionary" and Richardson's "English Dictionary;" and I bring this part of my paper to a

* "The greatest politician is the greatest fool; for he turns all his religion "into hypocrisy, into *statisme*, yea into atheisme, making Christianity a very foot-"stoole to policy."—JUNIUS, *Sin Stigmat* (1639), p. 613.

"Hence it is that the enemies of God take occasion to blaspheme, and call our "religion *statism*."—SOUTH, vol. i, sermon 4.

"And besides them I keep a noble train,
Statists and men of action."—*Gonzales.*
} BEAUMONT and FLETCHER, *Laws of Candy*, act ii, scene 1.

"You are an eminent *statist*, be a father
To such unfriended virgins, as your bounty
Hath drawn into a scandal."
} FORD, *The Fancies Chaste and Noble*, act ii, scene 3.

"Statists indeed,
And lovers of their country."
} MILTON, *Paradise Regained.*

"Though he (Cicero) were sparing otherwise to broach his philosophy among "*statists* and lawyers."—MILTON, *Doct. and Disc. of Divorce*, b. ii, c. 3.

"The people looking one while on the *statists*, whom they beheld without "constancy or firmness."—MILTON, *History of England*, vii, b. ii.

"He (Gardner) was a learned man and of excellent parts, a great *statist*, and "a writer of many books."—WOOD, *Fasti, Oxon*, vol. i.

Posthumus to Philario. "I do believe
(*Statist* though I am none, nor like to be)
That this will prove a war."
} SHAKSPEARE, *Cymbeline*, act ii, scene 4.

"I once did hold it, as our *statists* do,
A baseness to write fair."
} *Hamlet to Horatio.* *Hamlet*, act v, scene 2.

"As the *statist* thinks, the bell clinks."—*Old Proverb.*

"*Statists* and *politicians* unto whom *Ragione di Stato* is the first consider-"able, as though it were their business to deceive the people."—SIR THOMAS BROWNE, *Pseudodoxia Epidemica* (Vulgar Errors), book i.

"*Statists* that labour to contrive a commonwealth without our poverty, take "away the object of charity, not understanding only the commonwealth of a "Christian, but forgetting the prophecy of Christ."—SIR THOMAS BROWNE, *Religio Medici*, part ii, 1642.

close by quoting the definition of Statistics given in those works. "Statisticks (from Statism or Statist). That part of municipal "philosophy which states and defines the situation, strength, and "resources of a nation."—Todd's *Johnson*. "Statistick (*Fr.* Statis-"tique) is a word for which we are said to be indebted to a living "writer. Statisticks is applied to everything that pertains to a "State—its population, soil, produce, &c."—Richardson.*

How the word *Statistik* came to undergo so considerable a change of meaning, as to imply not a history or description of States and Kingdoms, but only a part of the materials of which such history or description is composed (as if for a stately building we were to substitute the bricks or stones, for a finished painting some only of the colours), it would not be easy to point out, nor would the search after the facts repay the labour of the investigation. Suffice it to state that such a change had already taken place when this Society was first called into existence in the year 1834.

On referring to the Report of the third meeting of the British Association, held at Cambridge in 1833, I find Professor Sedgwick stating from the chair that, in addition to the five existing sections, another, originating with some distinguished philosophers, had come into operation, the object of which was to promote *statistical* inquiries. The president thought it necessary to justify the addition of this sixth section, and, in doing so, insisted that it should limit itself to "matters of fact," "mere abstractions," and "numerical "results," constituting what might be called "the raw material to "political economy and political philosophy," by which perhaps "the "lasting foundations of those sciences may be ultimately laid." The formation of this new section was referred to in the following year as the prelude to the establishment of a flourishing society which acknowledged itself the offspring of the Association, and promised, by a similar procedure, to advance materially the greatly neglected subject of British statistics. The prospectus of our Society, which was printed in the Transactions of the Association, fixed the date of our foundation as the 15th March, 1834, and set forth very clearly our objects and plan. It stated that the Statistical Society of London was established for the purpose of procuring, arranging, and publishing "facts calculated to illustrate the condition and "prospects of society," that "the first and most essential rule of its "conduct" was "to exclude carefully all *opinions* from its trans-"actions and publications—to confine its attention rigorously to "facts—and, as far as it may be found possible, to facts which can be "stated numerically, and arranged in tables."

* The living writer here spoken of is probably M. B. P. Capper, "Statistical Account of the Population, &c., of England and Wales, 1801."

It will be seen, then, that at the date of the establishment of the Statistical Section of the British Association, and of this Society (its offspring), *statistics* had already come to mean rather the materials of a science than the science itself. As Professor Sedgwick understood the word, it represented mere facts to be used as the raw material of political economy and philosophy, but as the Founders of our Society apprehended it, the facts were to be applied to the building up rather of a social than of a political edifice. But there was one point upon which all parties seem to have been agreed. The statistical labourer was not to be indulged with the luxury of opinions; he was to be a patient drudge, binding up his sheaves of wheat for others to thresh out. The very crest and motto of the Society, stared him in the face from the cover of every *Journal*, reminding him of the humble and unintellectual work expected at his hands. In putting forth this restricted and unattractive programme, the British Association seem to have been actuated by a desire to secure for the new section facts as trustworthy as the observations and experiments in physical science, with which the other sections had to do; while the Statistical Society wished to separate itself as much as possible from the hypotheses and unfounded assertions which had heretofore formed great part of the stock in trade of the political economist and social reformer. But both parties overlooked the fact that the new section of the Association on the one hand, and the Statistical Society on the other, had other functions to discharge than that of mere depositories of facts. Meetings were to be held at stated intervals, which should offer to those who attended them, such attractions as are put forth by other societies. The members would expect to listen to, and to take part in, not merely dry strictures on the author's facts and figures, the soundness of the units, and the sufficiency of the numbers, but discussions on the broad principles which the figures might seem to suggest or establish. If the author could succeed in concealing or stifling his opinions, his audience would not be restrained from expressing theirs; and it was surely hard to deny him a liberty which could not be refused to them.

It is obvious, too, that exactly in proportion to the talent and originality of the author, and the desire of the members to profit by his labours, would be his own restiveness under the restrictions imposed upon him. Accordingly, as early as May, 1835, we find Mr. Hallam, the treasurer of the Society, at a meeting at which he himself presided, "giving an account of regulations enacted by the "magistrates of Ypres, for the maintenance of the poor in the year "1530," in which account there does not occur a single figure, much less a single tabular statement, but the distinctly expressed *opinion* that these Belgian provisions for the poor formed the model for our

own English legislation in the reigns of Henry VIII and Elizabeth: and in December of the same year, Mr. G. R. Porter reads a paper "On the Connection between Crime and Ignorance, as exhibited in "Criminal Calendars." Now Mr. Hallam begins his communication by remarking "that it seems within the province of the Statistical "Society to collect such information from the history of past times, "as illustrates the condition of society, especially in relation to the "more important discussions of political economy;" and Mr. Porter, after rehearsing the objects of the Society, observes "that occasions "will sometimes arise when it may be permitted to the members "of the Statistical Society to offer the result of investigations "whereby they may have detected fallacies, and especially those "which have been suggested, and are apparently supported by "inquiries more strictly coming within the limits of statistical "labours." Thus early, then, in the history of this Society, do we find its very founders and office-bearers, men of whom we are justly proud, breaking through the narrow bounds within which it was sought to confine them, and setting at nought the self-denying ordinance which, had it been narrowly observed and strictly acted up to, would have made the Statistical Society of London a very bye word for contented dulness and senseless drudgery. But fortunately for us the Society has become moulded almost imperceptibly into a more attractive form. The facts and figures of many of our most valued contributions have first been collected and arranged by men who submitted to the labour because they had opinions which they wished to bring to the test, and have then been brought before us instinct with the living energy and force which thought lends to fact.

The most cursory examination of the *Journals* of the Society, or of the excellent Index to their contents, must serve to convince us that the eminent men to whom I have just referred, did not stand alone in their disobedience to the strict letter of our original prospectus. Their successors followed their example, and produced papers for discussion at our evening meetings, and for subsequent publication in the *Journal*, of which it may be worth while to attempt an analysis. I find that these papers admit of being arranged in at least as many groups as those which follow:—

1. Papers giving an account of the existing state or condition of entire nations or kingdoms—such an account as Achenwal himself would have designated by the term *Statistik*.

2. Papers giving a similar account of parts only of such nations or kingdoms, of provinces, counties, districts, cities, towns, and parts of towns, rural districts, and villages. These descriptions would probably have received from Achenwal the same designation.

3. Papers discussing, in relation to whole kingdoms, or parts of them, such matters as education, crime, industry, health, wealth,

manufactures, commerce, special branches of industry and production, &c.

4. Reports of the inquiries of committees appointed by the Council, as the Committees on Education in Westminster, Finsbury, and London, on the state of Church Lane, St. Giles's, on Registration and the Census, on Beneficent Institutions, &c.

5. Polemical papers, contesting the opinions of authorities past or present, as derived by them from the use of numerical returns or otherwise.

6. Papers on the numerical method, and the scientific treatment of facts and figures.

7. Papers discussing, without the aid of figures, some historical question, or some question relating to the proper meaning and use of terms employed by the political economist or student in some allied science. These papers are few in number, and may be looked upon as exceptional.

8. Papers on subjects belonging properly to some well defined branch of science, such as physiology or medicine, admitted into the *Journal* as rich in facts and figures, but having no direct bearing on the objects of "statistics" properly defined. Such are some parts of the paper of Dr. Clendenning "On the Relative Frequency of "Pulmonary Consumption and Diseases of the Heart," published in the first volume of the *Journal*, and the greater portion of that of Dr. Hutchinson, "On the Results of Experiments with the "Spirometer," published in vol. vii.

This classified outline of the papers submitted to the Society for discussion, and printed in our *Journal*, will prepare the way for the consideration of the second subject comprised in the title of my paper, namely,

2. *The Proper Functions of a Statistical Society.*

It will not, I think, be disputed that Achenwal's definition of the word *Statistik* is quite in keeping with the now acknowledged functions of a statistical society, and that if the meaning of the term be so enlarged as to embrace not States or kingdoms only, but all their constituent parts, the functions of the society may be very properly enlarged in a like degree.

Again, it will not be denied that Achenwal was right in insisting upon the value of facts, nor that a statistical society would forfeit its distinctive character, if it did not aim at collecting, arranging, and tabulating facts, as its means of illustrating and describing the actual condition of States, Kingdoms, and their constituent parts.

But it is evident that the definition of Achenwal, even with the extension here indicated, would be too narrow to embrace all the proper functions of a statistical society, as now generally understood. Something more than a true history and description of

States and their constituent parts is clearly implied in the words used by our founders, when they describe our object and plan to be the procuring, arranging, and publishing "facts calculated to illus- "trate the condition and prospects of society." Now the word "society" is evidently not synonymous with the word "State," and it is doubtful whether Achenwal ever proposed to himself that minute and comprehensive survey of man as a being living in society which our founders had in view. He contemplated, as I think, an improved history of States; we an improvement in the condition of the individual, the constituent unit of the State. He aimed at a correct knowledge of States for the sake of the knowledge itself; we at a perfect knowledge of the individual, with a view to his improvement as a man, such knowledge being impossible of attainment through the isolation of an individual from the class to which he belongs, inasmuch as the propriety of the selection might be questioned; such improvement being equally impossible through the obvious inadequacy of remedial measures, applied merely in detail, to individuals suffering some common injury. Hence the necessity of large numbers of facts.

The true conception of the functions of a statistical society may, I think, be best arrived at by combining into one comprehensive sentence the definition of Achenwal and the statement of our prospectus, and adding to this combined formula, such minor details as are obviously suggested by the proceedings and usages of our Society. If this view of the matter be correct, the following summary of the proper functions of a statistical society will not be very wide of the truth:—

1. To collect and preserve facts illustrating the past and present condition and probable future prospects of States and their territorial divisions, and of the several classes of their inhabitants. This is best done by means of a library, well arranged and duly catalogued, containing both books and manuscripts.

2. To add to existing facts by the special inquiries of committees, or of persons appointed for the purpose.

3. To promote the discussion of unsettled questions and the correction of erroneous views in political and social economy, by arranging for the reading of papers at periodical meetings to be held for the purpose, such papers only to be deemed to be within the province of the Society, as make use of facts and numerical statements in support of the views therein expressed.

4. To encourage to the utmost all efforts tending towards the establishment of sound principles for the guidance of those who engage in the work of collecting, arranging, and tabulating facts, and in applying the numerical method to the discovery of truth.

5. To discourage the improper use of the word statistics as a

mere synonym for collections of facts, irrespective of the use to which they are put; and to uphold the dignity of the Society as applying facts of a peculiar order to purposes of the highest utility.

6. To discourage and repress all encroachments on the arena of politics, as objects of party strife.

Such would appear to be the proper functions of a statistical society as determined by a joint consideration of the original meaning of the term Statistics, the programme of our Society, and our experience of its actual working.

3. *Is there a Science of Statistics; and, if so, what are its Nature and Objects, and what is its Relation to Political Economy and Social Science?*

It is obvious that we are not in a condition to answer the question, whether there be a *Science of Statistics*, until we have first settled (if that be possible) the meaning of the word Science itself; and it is equally obvious that this word is one of very unsettled import, having every shade of meaning between *knowledge arranged and methodised*, and *certainty based on demonstration*. On consulting the same Dictionaries from which I collected the meanings of the words Statist and Statistics, I learn that according to the usage of the best authors, science may either retain its original meaning namely, *knowledge*, or come to signify any "one of the seven liberal arts," or "any art attained by precepts or built on principles," or "certainty grounded on demonstration." If Shakspeare and Pope may be cited as authorities for the right use of words, music and mathematics are sciences, as are also the seven "liberal arts," grammar, rhetorick, logick, arithmetick, musick, geometry, and astronomy. Glanville, a prose writer cited by Johnson, goes the extreme length of speaking of the "indisputable mathematics" as the only *science* heaven hath yet vouchsafed to humanity. Gibbon seems to use the word science as equivalent to the word speculation.

But the adjective, *scientifick*, appears to have been used by our best prose writers in one and the same sense of demonstration or certainty. Thus Sir Thomas Browne appears to consider science as "natural philosophy proceeding from settled principles," and issuing in "a sure and rational belief;" Howell speaks of *scientifical* knowledge, as something of unusual excellence; South of *scientifick* evidence as something surpassing "high probability" and "moral certainty;" and Locke has the phrase "scientifical or demonstrative reasoning," and speaks of "a comprehensive, *scientifical*, and satisfactory knowledge of the works of nature."*

If from the works of authors cited in dictionaries, we pass on to consider the more formal definitions of science as given by our best

* See Todd's Johnson, and Richardson's "English Dictionary," under the words "Science" and "Scientifick."

authorities, we find great differences of meaning. I will content myself with quoting two eminent scientific men, Sir John Herschel and Professor Sedgwick. The former, in his "Discourse on Natural "Philosophy," p. 18, tells us that "Science is the knowledge of "many, orderly, and methodically digested and arranged, so as to "become attainable by one." The latter understands by science (I quote from his address to the British Association in 1833), "the consideration of all subjects, whether of a pure or mixed "nature, capable of being reduced to measurement and calculation." These definitions may be taken to indicate the two extremes of meaning of the word Science. It can mean nothing less than the one, nor more than the other. But perhaps its true meaning is to be gathered not from dictionaries or from the definitions of philosophers themselves, but from a close examination of its primary and secondary uses as drawn from examples. It is in this way that I shall myself attempt to answer the question—What is a science?

In the first place, it is obvious that the word Science originally meant knowledge, as the word Art meant skill, and that *a* science meant a special application of knowledge as *an* art did a special application of skill. But it is also obvious that the words science and art have ceased to be exactly synonymous with knowledge and skill. They evidently mean knowledge and skill with certain qualifications and reservations.* An art, so long as it continues to be a mere affair of skilful handiwork, remains an art; but directly it submits itself to the guidance of well ascertained general principles, it may claim to be a science, provided only that its applications have a certain largeness of scope, combined with utility of a high order. Thus there is an art of music, and a science of musical composition; an art of drawing, and a science of perspective; an art of construction, and a science of architecture; an art of reasoning, and a science of logic; an art of persuasion, and a science of rhetoric; an art of calculation, and a science of arithmetic. In all these instances the art has a large aim and an undoubted utility as ministering to some universal want, or some general craving for refined amusement of the senses and mind, while the science is characterised by the universality and precision of its application to the special instances created by the corresponding art.

An examination, therefore, of the arts that have grown into sciences, and are generally acknowledged to deserve the name, shows that the characteristic of sciences is the possession of general principles applied with precision to individual instances furnished by the arts out of which they have grown, or to which they lend their aid. In some instances, it will be seen that the principles of the

* "Knowledge, emphatically, not imperfect or pretended."—Richardson's "English Dictionary."

science, though precise, are few in number, while the art is characterised by largeness of application within very narrow limits. Such is the science of logic as applied in the art and act of reasoning. In other cases, arts draw their rules of practice from more than one science, as is the case with architecture, which rests on the sciences of construction and ornamentation; or with the modern art of war, which uses the sciences of projectiles and of fortification, to which may perhaps be added the science of chemistry, and possibly a science of self-defence, of which fencing, with its precise phrases and definite rules of procedure, is the highest development.

In order, then, that any special application of knowledge or of skill may attain to the dignity of a science, and claim its patent of nobility, it must show universality and precision in its principles or rules, and utility of a high order in the application of them. But to these marks or signs of science, we must make some addition if we would satisfy the requirements of those who use the word science in its most restricted sense. They will have it that the principles or rules in question must not only be universally applicable to all suitable special instances, but they must be expressed in figures of arithmetic, and the results of their application must be certain. The eclipse must happen to a moment, and last for its calculated period; the elements of a compound body must combine in their atomic proportions to the ten-thousandth of a grain; musical notes must be so arranged and combined, as not to offend the most sensitive ear; and the lines of a drawing in perspective, must fall with such minute precision, that the most practised eye shall not detect the least departure from nature.

But is it not obvious that to limit the application of the word science thus narrowly, is to deny the use of that honourable title to some of those branches of knowledge which have been enriched by the greatest and most fruitful discoveries? Surely the men who in practising the noble art of healing, walk in the light of the discoveries of Harvey and Charles Bell, who have attained to the prevention of at least one loathsome malady, and to the performance of operations without pain; who have completed their knowledge of anatomy, and made great progress in the study of minute structure, of the chemical components of the body and its secretions, and of the subtle causes of disease; who make constant and skilful use of the most delicate instruments of investigation; who possess many approved remedies, some of which they apply with certainty to the cure of some maladies, and to the relief of others; have a claim to a higher title than that of mere artists, and may speak of themselves as men of science, and boast of a science of medicine, though their few certainties are mixed up with much that is purely conjectural, and their best knowledge runs like a golden thread through a

tissue of imperfectly ascertained facts. For like reasons it would be unjust to those who practise the excellent arts of farming and horticulture in the light of modern discoveries, to refuse to acknowledge a science of agriculture; and to the statesmen who administer the affairs of nations on the principles established by such men as Adam Smith, a science of political economy.

But in actual practice the term science is applied to branches of knowledge which are nearly or quite innocent of the use of figures; as, for instance, to Botany, which had earned its title by careful classification and exact description, even before it called to its assistance the microscopist to unravel, and the chemist to analyse, the tissues of plants. Zoology and Entomology, have perhaps even less claim to the name of sciences; and Geology owes that title rather to the largeness and grandeur of its objects, than to the precision of its information.

Chemistry, again, of which the claim to the dignity of a science is not to be disputed, owes its proud position to many distinct causes —to the joint possession of a numerical theory, of a precise and condensed nomenclature, of delicate instruments of analysis and discovery, joined to its perfect command of the materials on which it operates, and its intimate relations with other sciences on which it is in a condition to confer the greatest benefits.

In direct contrast to the science of chemistry, stands a branch of knowledge which has no practical applications, and owes its title to be termed a science solely to the dignity and surpassing interest of its object, and the singular talent and acuteness of its most distinguished cultivators—I mean the science of metaphysics. Setting this aside as exceptional, we may say of science in general that it should have practical applications of acknowledged utility and dignity, and general principles, comprehensive and precise, to which the mere practice of an art could not have given rise. But the hastiest survey of those branches of knowledge to which the term science has been, by general consent, applied, reveals a diversity of character in keeping with the obvious variety of practical pursuits to which men are impelled by necessity or choice. Astronomy has to do with objects of which the mass cannot be increased or lessened, nor the composition altered, nor the movements controlled by human interference. Its claim to be a science must, therefore, rest, in the main, on the exact fulfilment of its prophesies. The sciences which preside over all our great works of construction, are tested by the stability and durability of the works for which they supply the necessary numerical data. Chemistry vindicates its title by the visible and tangible results of its operations. But the sciences which have to do with living beings, whether in the vegetable or animal kingdom, must rest their claims rather upon the fidelity of their descriptions,

and the soundness of their classifications, than on the fulfilment of their predictions or the power which they can exert. The knowledge which they have acquired by the observation of many individuals differing widely from each other, cannot be applied with certainty to the individuals themselves, but only to groups of individuals similar to those which first supplied the knowledge. And that which is true of the plant or the animal, is true of individual men as members of society. It is from groups of persons that we obtain our knowledge; it is to like groups that we apply it. We cannot, therefore, refuse to the Actuary who first collects and arranges facts relating to the duration of human life, and then calculates the expectation of life, the title of a man of science, for no better reason than that his calculations possess the high utility of which I have been speaking, not when applied to the individual man, but only when brought to bear (as in life assurance) on great numbers of persons. And so must it be with the Statist, in the sense in which I would use the term. He collects and arranges his facts, calculates their average value, marks, in some cases, their extreme values, and would make application of his knowledge to the groups or classes to which the facts relate, but that the right and power of action rests with the State and not with him. But the fact that the results which he obtains are applicable in practice not to individuals but to classes, and the accident, so to speak, which separates the discovery of truth from the power of applying it, cannot destroy the dignity of his pursuits nor rob statistics of its right to take rank among the sciences. And if, as in the case of chemistry, to which I have already adverted, the claim to be called a science rests on more attributes than one, this same claim may be set up on behalf of statistics: for we, too, have our classifications and our nomenclature; we, too, have our numerical method; we, too, have powerful instruments of analysis in our tabular forms; we, too, have the most universal and subtle of all the means of discovery, the power of eliminating disturbing elements, of establishing numerical equalities, and exhibiting residues as containing the cause or causes which made two or more numerical statements to differ from each other. We largely use the true Baconian method of induction, and Lord Bacon's own favourite instrument the *Tabula inveniendi*. Lastly, of the utility and dignity of our pursuit there cannot be a doubt.

From these considerations, then, I infer that there is a SCIENCE OF STATISTICS—a science worthy of respect, encouragement, and support—a science of which the members of this Society may be justly proud—a science to which States and nations need not be ashamed to acknowledge their obligations.

The question of the relation which this science of statistics bears to Social Science and Political Economy, is the only one which,

according to the title of this paper, remains to be discussed. My answer to this question will be anticipated from what has gone before. The science of statistics is a comprehensive science, of which "social science" and political economy are only branches or departments. The original prospectus of this Society, already quoted, did really establish a Social Science when it stated as its object the procuring, arranging, and publishing of "facts calculated to illustrate the condition and prospects of society;" while Professor Sedgwick spoke of the Statistical Section of the British Association, to which, as I have shown, this our Society owes its origin, as dealing with "matters of fact," "mere abstractions," and "numerical results," which were to furnish "the raw material to political economy and political philosophy;" by which, as he thought probable, "the lasting foundation of those sciences might be ultimately laid." So that this Society may be said to have from the first cultivated both social and political science in the only satisfactory way—by the accumulation of facts. The fact that a Society calling itself the "*Social Science Association*," has within a few years come into existence, does not in any way invalidate our claim to have first set on foot, in fact, though not in express terms, a social science; nor, if we were to lay claim on our own behalf, to the exclusive cultivation of that science, should we do any injustice to the younger society. For it is obvious that the work done by the Social Science Association, excellent as it is, is not in the nature of science. It may be described, without injustice, as a Social Reform Association, encouraging the discussion of alleged social evils, inviting publicity, and taking practical steps, by means of memorials, petitions, and deputations to men in authority, to promote legal and social reforms. To the members of that Association, and to all other men, we offer the services of a social and political science, slowly and painfully constructed on the basis of facts laboriously brought together, but upon the collection, arrangement, tabulation, and analysis of which we bring constantly to bear the pure bright light of scientific method. We do not allege that there is no other way to social reform and improvement but this toilsome path of ours; we know that many financial, social, and legal habits, arrangements, and procedures may be convicted of folly, inconvenience, and injustice, without the use of a single figure of arithmetic; but we also know that in almost all disputed questions, our aid is invoked, because we are believed to collect, arrange, and classify our facts in the true spirit of science, calmly and impartially, having as our primary object the discovery of truth by facts, and not the redress of grievances.

But it is time that I bring this communication to a close. In doing so, I trust that I may lay claim to some success in my attempt to give increased dignity and importance to this Society, and a new

interest to the labours of its members. For myself, at least, I may say, that in offering to the Society a long series of communications on which I have bestowed much labour and thought, I acted in the belief that I was contributing to the gradual, slow growth, not of heaps of facts without reference to their use or application, but of a veritable science, social and political—a science with a definite aim, an orderly classification of subjects, a numerical method with its strict rules of synthesis and analysis—something more than the *Statistik* of Achenwal, nothing less than "the political economy and "philosophy" of Sedgwick; a science which I believe it to have been the real aim of our founders to establish when they announced their intention to illustrate by facts the condition and prospects of society. I hope also to be forgiven if I so far ignore the rude conceptions of our original prospectus, as to indulge in the luxury of "opinions," and to respect the now disused motto which bids me bind up my sheaves of wheat for others to thresh out, rather as a venerable relic of the past, than as a principle of action to be at this moment implicitly obeyed and acted upon.*

* I append a tabular sketch of the chief divisions of Statistics recognised in the original prospectus of the Society,—a prospectus drawn up by Henry Hallam, Charles Babbage, Richard Jones, and John Elliot Drinkwater, constituted a provisional committee for the purpose. The committee did not point out distinctly the subdivisions of medical statistics. They are assumed to be the two printed in a distinctive type.

Economical—

1. Natural productions and agriculture of nations.
2. Manufactures.
3. Commerce and currency.
4. Distribution of wealth (rent, wages, profits, &c.).

Political—

1. Facts relating to the elements of political institutions, the number of electors, jurors, &c.
2. Legal statistics.
3. Finance and national expenditure, civil and military establishments.

Medical—

1. (? **Preventive Measures**).
2. (? **Curative Measures, Hospitals, &c.**).
3. Population.

Moral and Intellectual—

1. Statistics of literature.
2. Education.
3. Religious instruction and ecclesiastical institutions.
4. Crime.